

WHAT IS CLAIMED IS:

1. An optical transmitting device for transmitting an optical signal via an optical transmission path to a receiving device connected via prescribed communication lines to first to n'th terminal devices (where n is an integer of 2 or more), the optical transmitting device comprising:

a modulating section for generating first to n'th modulated signals based on first to n'th data signals to be transmitted to the first to n'th terminal devices, respectively, the first to n'th modulated signals being obtained by modulation with individual modulation parameters;

an optical transmitting section for converting the first to n'th modulated signals generated by the modulating section into an optical signal and for transmitting the optical signal to the receiving device via the optical transmission path;

a data amount estimating section for estimating an amount of data for each of the first to n'th data signals; and

a parameter control section for setting the individual modulation parameters used in the modulating section based on amounts of data for the first to n'th data signals estimated by the data amount estimating section.

2. The optical transmitting device according to claim 1, wherein the modulating section includes a frequency converting

section for performing frequency conversion on the first to n'th modulated signals so as to have respective different frequencies.

3. The optical transmitting device according to claim  
5 1, wherein the data amount estimating section estimates the amount of data for each of the first to n'th data signals based on the data signal itself.

4. The optical transmitting device according to claim  
10 1, wherein the data amount estimating section previously holds information about each of the first to n'th terminal devices with respect to use of a corresponding one of the prescribed communication lines, and estimates the amount of data for each of the first to n'th data signals based on the information and  
15 a current time.

5. The optical transmitting device according to claim  
1, wherein the parameter control section comprises:

a group classifying section for classifying the first  
20 to n'th data signals into a plurality of groups in accordance with the amount of data estimated for each of the first to n'th data signals by the data amount estimating section; and

a parameter setting section for setting modulation  
parameters at the same value for each of data signals classified  
25 into the same group by the group classifying section.

6. The optical transmitting device according to claim 5, wherein:

the parameter control section further includes a  
5 histogram generating section for generating, based on amounts of data estimated by the data amount estimating section, a histogram in which the amounts of data are divided into prescribed units of divisions; and

the group classifying section uses the histogram  
10 generated by the histogram generating section to form the plurality of groups.

7. The optical transmitting device according to claim 1, wherein the parameter control section sets the individual  
15 modulation parameters so as to have values within a range such that the first to n'th modulated signals satisfy a condition concerning a transmission quality in the optical transmission path.

8. The optical transmitting device according to claim  
20 7, wherein the parameter control section further includes:

a condition determination section for determining, based on the individual modulation parameters, whether the first to n'th modulated signals satisfy the condition concerning the transmission quality in the optical transmission path; and

25 a modifying section for modifying the individual

modulation parameters when the condition determination section determines that the condition is not satisfied.

9. The optical transmitting device according to claim 5 8, wherein the condition is such that a total mean square root optical modulation index, which is determined based on the individual modulation parameters of the first to n'th modulated signals, is lower than or equal to a prescribed value.

10 10. The optical transmitting device according to claim 1, wherein the individual modulation parameters include constellation levels used for performing quadrature amplitude modulation on each of the first to n'th data signals, and signal levels of modulated signals obtained by the quadrature amplitude 15 modulation.

11. The optical transmitting device according to claim 1, wherein the individual modulation parameters include the number of subcarriers used for performing discrete multi-tone modulation 20 on each of the first to n'th data signals.

12. An optical transmission system comprising:  
a transmitting device for transmitting a signal via an optical transmission path;  
25 a receiving device for receiving the signal transmitted

via the optical transmission path; and

first to  $n$ 'th (where  $n$  is an integer of 2 or more) terminal devices connected via respective prescribed communication lines to the receiving device,

5            wherein the transmitting device comprises:

          a modulating section for generating first to  $n$ 'th modulated signals based on first to  $n$ 'th data signals to be transmitted to the first to  $n$ 'th terminal devices, respectively, the first to  $n$ 'th modulated signals being obtained by modulation  
10 with individual modulation parameters;

          an optical transmitting section for converting the first to  $n$ 'th modulated signals generated by the modulating section into an optical signal and for transmitting the optical signal to the receiving device via the optical transmission path;

15            a data amount estimating section for estimating an amount of data for each of the first to  $n$ 'th data signals; and

          a parameter control section for setting the individual modulation parameters used in the modulating section based on amounts of data for the first to  $n$ 'th data signals estimated  
20 by the data amount estimating section,

          wherein the receiving device includes:

          an optical receiving section for receiving an optical signal transmitted via the optical transmission path and for converting the optical signal into an electric signal; and

25            an electric transmitting section for transmitting

the first to n'th modulated signals contained in the electric signal,  
which is obtained by conversion via the optical receiving section,  
to the first to n'th terminals to which the first to n'th modulated  
signals should be transmitted via the prescribed communication  
5 lines, and

wherein each of first to n'th terminal devices includes  
a demodulating section for demodulating a modulated signal  
transmitted via a corresponding one of the prescribed communication  
lines.

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13. The optical transmission system according to claim  
12, further comprising a first transmission path connected between  
the receiving device and the transmitting device,

wherein the receiving device further includes:

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a distortion monitoring section for detecting a  
distortion level at a prescribed frequency in an electric signal  
obtained by optical-to-electrical conversion via the optical  
receiving section; and

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a distortion information transmitting section for  
transmitting distortion level information about a distortion level  
detected by the distortion monitoring section to the transmitting  
device via the first transmission path, and

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wherein the parameter control section sets the  
individual modulation parameters such that the distortion level  
indicated by the distortion level information transmitted via the

first transmission path becomes lower than or equal to a prescribed distortion level value.

14. The optical transmission system according to claim  
5 12, further comprising second transmission paths connected between  
each of the first to n'th terminal devices and the transmitting  
device,

wherein each of the first to n'th terminal devices  
further includes:

10 a quality detecting section for detecting signal  
quality of the modulated signals transmitted via the prescribed  
communication lines; and

a quality information transmitting device for  
transmitting the signal quality information about the signal  
15 quality detected by the quality detecting section via the  
prescribed communication lines,

wherein the parameter control section sets the  
individual modulation parameters such that the signal quality  
indicated by the signal quality information transmitted via the  
20 second transmission path satisfies a prescribed requirement.